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ABSTRACT

Viewing human development as a process by which the human gains self-control, this essay argues that locomotion and speech are control-oriented motor movements and suggests that cognition is also a form of movement developed as the individual achieves control over his or her thinking processes. Support for this view of cognitive development is adduced from the maturation of children's capacity to draw or copy geometric forms, electroencephalography, Piagetian developmental epistemology, and some research findings on the relationship of physical maturation to mental growth. The concept of the release of growth forces for thinking is subsequently discussed in terms of physiology and acupuncture. Evidence for the existence of an etheric or bioplasmic body is cited, drawing on Russian parapsychology, the Kirlian photographic process, and the phenomenon of phantom limbs. Prefiguration of these findings in the thought of Rudolf Steiner is indicated. In summary, it is suggested that, when a child reaches certain levels of physiological or biological maturity, forces of growth are released for new and subtle functions such as memory and thinking. However, depletion of bioplasmic forces during formative years reduces energy available later for cognitive development, and premature learning undermines physical development. Implications of the theory for human development and education are discussed, with attention being given to environmental retardation, school readiness, and the consequences of premature or forced learning. (RH)

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AN INTERPRETATION OF RUDOLF STEINER'S THEORY OF CHILD DEVELOPMENT AND SCHOOL READINESS

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Studies and research in child development have long known of the simultaneous relationship between physical maturation and intellectual development. 1,2 The characteristic of the stages of physical development and the stages of cognitive development such as those developed by Piaget have been fully described, but few researchers have ventured to ascribe a cause-effect relationship. 3 But we are unaware of how the relationship of physical development, readiness and cognitive developmental stages are related and how and why they unfold sequentially. Therefore, the purpose of this article will be to attempt to explicate and develop a rationale for causal-effect relationship between physical and mental development as it unfolds in the growing child in relationship to the concept of bioplasmic forces. We will examine this relationship in relation to Piaget's stages as they relate to controlled-movement and bioplasmic energy or forces.

The first premise we begin with is that human development is a process by which the human being gains greater voluntary control over himself, i.e., over his motor, speech and cognitive development. For example, the new born baby has no voluntary controlled movements; his movements are chaotic, but soon after birth, control of movement develops from the head downward.

The child's development begins with movement control of the eyes, the entire face, descending over the neck, which gradually allowing the child to turn and lift its head. Then voluntary control of movement gradually descends further to the arms and hands; here the child develops the ability to co-ordinate eye-and-hand movement and to grasp objects by the third month. By the fifth month the child sits-up. Gradually by the end of the first year of life voluntary movement control has descended yet further enabling the child to stand and walk. In a period of a year the child has developed a minimal level of voluntary control over his motor system.

It will take many years before growth has sufficiently descended from the overlarge head at birth to allow the proportionately small limbs to develop to mature proportion. 4

Accompanying this descent in movement-control of motor development is the development of language.

> Since motor development is one of the most important indices of maturation, it is not unreasonable to assume that language development, too is related to physical growth and development. It is

also interesting that language development correlates better with motor development that it does with chronological age. 5

Lenneberg has developed the following ordinal scales out of the stages of motor language development. 6

Table 1
Correlation on motor and language development

Age (Years)	Motor Milestones	Language milestones
0.5	Sits using hands for support; unilateral reaching	Cooing sounds change to babbling by introduction of consonatal sounds.
1	Stands; walks when held by one hand	Syllable reduplication; signs of understanding some words; applies some sounds regularly to signify persons or objects, that is the first words
1.5	Prehension and release fully developed; gait propulsive; creeps downstairs backward.	Reportoir of 3 to 50 words not joined in phrases; trains of sounds and intonation patterns resembling discourse; good progress in understanding.
2	Runs (with falls); walks stairs with one foot forward only	More than 50 words; two-word phrases most common; more interest in verbal communication; no more babbling.
2.5	Jumps with both feet; stands on one foot for 1 second; builds tower of six cubes.	Every day new words; utterances of three and more words; seems to understand most everything said to him; still many grammatical deviations
3	Tiptoes 3 years (2.7 meters); walks stairs with alternating feet; jumps 0.9 meter	Vocabulary of some 100 words; about 80 percent intelligibility; grammar of utterance close approximation to

		colloquial adult; syntactic mistakes fewer in variety, systematic, predictable
4.5	Jumps over rope; hops on one foot; walk on line	Language well established; grammatical anomalies restricted either to unusual constructions or to the more literate aspects of discourse.

Just as there is a descent of voluntary control of movement during the first year of life from the head (cognitive), through the trunk (affective), the limbs (psychomotor), there is also a progression of language development in terms of the ability to grasp grammatical categories from the cognitive through the affective (emotional), to the psychomotor realm. Just as the body has its three realm, language has also a similar three-fold sequence or body. That is, the noun corresponds to the head (cognitive), the adjective to the feeling realm-the heart, etc. (affective), and the verb to the active limbs (psychomotor). Table II presents this sequence of language or grammatical sequential developments. 7

Table II

	Age	Nouns	Adjectives	Verbs
Cognitive	1.3	100%		
Affective	1.8	78%	22%	
Psychomotor	2.0	63%	14%	23%

At each level of motor development the child reaches a certain plateau of motor-movement control or maturation before language develops, a kind of controlled-motor readiness. It is also known that when the child is struggling for motor-movement control, there is an accompanying "slow-down" in language development. Once the child masters a certain phase of motor development, the rate of language development accelerates. (Refer to Table I). There seems to be a transformation of voluntary motor movements and locomotion to an extension of these movements in terms of perfection and control into the more refined and differentiated movements of speaking. Then the child grad - ually gains greater mastery over the finer muscles of mouth,

lips, tongue, and larynx--the speech organization. He increasingly gains control over his speech organization beginning with cooing, babbling, saying (imitation of words), and naming through talking. There is a transmutation from free to controlled locomotion followed by an accompanied increased differentiation and refinement of locomotion into the much more differentiated and refined movements of speech. There seems to be a transformation of activity and consequent displacement of energy in this transition. (The concept of energy will be discussed later in the paper.)

Prior to examining bioplasmic energy and the development of thinking in children, let us attempt to reinforce our position on voluntary control of movement and physical maturation in relation to readiness for certain kinds of learning and performance, e.g., the capacity to copy geometric forms.

Research indicates an orderly sequence of motor and developmental maturation is such that the capabilities for certain kinds of learning and performance such as language development fall along an age scale. Similarly, there is a hierarchy or developmental sequence of abilities to draw and copy geometric forms in relation to a kind of mythological-historical evaluation of the human race, the recapitulation theory. Ilg and Ames in School Readiness outline this developmental pattern of geometric forms drawn by children at different age levels. 8

Table III

Age in Years	Geometric Pattern	Physiological or Psychological Characteristics
10 mo. or less	Horizontal scribble	child lies in horizontal position
1.2	Selective horizontal isolated strokes	begins to stand and walk
1.6 - 2.	Vertical lines, and struggles with circle scribbling, experimenting	mastering climbing and walking

Table III

Age in Years	Geometric Pattern	Physiological or Psychological Characteristics
3.0	draws a cross; draws a single distinct circle for the first	child says "I" first person becomes aware of self as apart from his environment
4	draws square	hops, skips, jumps etc.
5	draws a triangle and oblique lines	continued mastery over locomotion
6	rectangle and diagonal	continued mastery over locomotion
7	draws or copies diamond	change of teeth, enhanced mental capacities

This development depends upon maturation, not experience. 9 For example, some children who can easily draw or copy a circle or a square cannot draw a diamond, but the reverse it not true. Also a child cannot be trained or forced to copy a particular geometric figure prior to his reaching the requisite stage of readiness to do so. The intensive training of a five year old in the specific act of drawing a diamond will not only be difficult, but ineffective. But at age seven, no training is necessary.

This developmental sequence of performance capacities, which are transitional stages and not distinct steps, emerges as a form of instinctive motoric development--reflected in evolutionary geometric patterns or forms. Piaget's study of the geometric operations in young children found that they draw topological structures before the projective and the projective before the metric. 10 Piaget maintains that this sequential pattern corresponds to something in the natural thought of children. Examined in the light of the voluntary control of movement theory, the forms drawn by children at different

stages of their sequential development reveal a natural process from the topological to the metric, from the circle to the square, triangle to the rectangle in that order. The circle requires less control than the square. One could say the circle is related to the active-motoric, the metric form to the active-cognitive. As Jensen points out because they are dependent on the maturation of the whole organism.

> ...these sequential stages are not abrupt steps but that these are transitional stages from one to another. Some transitions are relatively rapid, so that in pre-school years an age difference of just a few months can make quite a striking difference in the child's learning capacity for certain tasks.11

This maturational-readiness is based on the concept of unificational or organismic growth (a coined name of all available growth ages at a given point in the child's development); the growth patterns such as height age, mental age, dental age, etc...of a child tend to cluster around a mean.

> ...i.e., that the various attributes in an individual tend to cluster about a center of gravity of growth of that individual and that the freedom to vary is restricted. The detailed support has been worked out, but the manuscript has not been printed. 12

Hence, maturation is a complex organismic pattern which reaches levels or plateaus of development. It is from this orderly sequence of maturation that neural development and the capacity for certain kinds of learning and performance seem to unfold and fall along an age or performance scale.

Since locomotion and speech are control motor movements and speaking requires a more subtle and finer control of the muscles of the speech organization than does walking, running, etc., could not thinking or cognition be thought of as a still finer form of movement developed as one gains control over one's thinking processess?

This transitional development of thinking takes place in the young child about the second year of life. As the child's ability to think develops and unfolds he begins to differentiate percepts or objects in his environment. Piaget calls this period the transition between the sensory-motor at 2 years (in which the child's thinking is instinctive, he relies on his memory more; he senses differences between an individual item and a class, e.g., mother and women etc), and the concrete operational level of cognition.13

Perhaps as a consequence of the child mastering locomotion and speech, the child gains control over his cognitive processes. Unlike locomotion and speech there are no muscles involved"... but (a)...movement purely from percept, memory and imagination to concept, query and idea". 14 Modern psychological and neurological theories consider the brain to be similar to a muscle in that to develop it must be exercised and used.

Another indication of the dynamic aspects of thinking as movement is the functional basis of the electroencephalograph, which is used to measure noise levels and electrowave patterns of the brain. The electroencephalograph electrodes placed on the scalp of the subject measure 1/1,000,000 of a volt. The recorded noise level of the brain is about 100 times that potential. 15 The brain also has different rhythms, measured in cycles per second--delta waves (deep sleep), .5 to 3.5 cycles; theta waves (dominant in younger children), 4 to 7 cycles; alpha waves (dominant in adults), 8-13 cycles; and beta waves (exist in states of anxiety and psychological instability), 14-30 cycles. 16-17 Recent research in biofeedback and autogenic training has shown that a person can control the rhythms of the brain, muscle tension, temperature of body, headaches, hypertension (blood pressure), etc. 18

To explicate this point further, let us examine the act or process of cognition. When we are attempting to find a solution to a problem, we are searching for the correct concept or idea out of the rather vast store-house of concepts, ideas and experiences we already possess. We labor cognitively to find the proper connection or link between our knowledge and the solution. We sort, select and reshuffle our old concepts and we seek new ideas from other sources to reinforce and refine our knowledge. The conditions we desire for thinking or the sorting out process are quiet and solitude. This type of concentrative thinking does not take place automatically nor effortlessly. It requires contemplative effort and work. Effort requires energy. Mental fatigue is just as real as physical fatigue, because in both cases energy is expended. One could say that in physical labor energy is expended through overt movement, thinking energy is expended through covert movement. This hypothesis that thinking is movement will be elucidated further when we examine Piaget's stages of cognition. Prior to doing this let us summarize what had been said about the voluntary control of movement.

It has been stated that the descent of the voluntary control of motor locomotion during the first year of life proceeds from the head downwards through the trunk culminating in the limbs. During the second year, there is a decent of language acquisition form the cognitive (nouns), effective (adjectives), to the psychomotor (verbs). In the third year there is a more subtle descent of the capacity to think through memory and imagination to inquiry. Let us now examine Piaget's work in this light.

The Swiss psychologist Jean Piaget has shown that children manifest different mental abilities as they mature. Their thinking develops through a series of stages as they progress from early childhood through adolescence. Piaget has classified these into four main stages;

I. Sensory-Motor Stage (1-2 years)
II. Preoperational Stage (2-7 years)
III. Concrete Operational (7-11 years)
IV. Formal Operational Stage (11-15 & over years)

Each of these stages has its own particular characteristics. To explain this we will explicate the transitional period between the pre-operational and the concrete operational. At the preoperational level, the child has no understanding for change. He is involved in direct perceptual relationships, dependent upon what attracts him in which little reasoning is involved. In this pre-operational stage, for example, he focuses his attention on one dimension of the problem. If water is poured from a tall vessel into a shorter, wider vessel the child is prone to think the shorter vessel has less water in it. His thinking is one-dimensional; he centers on the height and not the width of the vessel. He relates quantity to shape and form of objects, but if the shape or form is changed he is confused. Another characteristic of the pre-operational level is that his thinking is not reversible. For example the child can not reason that there was the same amount of liquid in each vessel (even though he saw the liquid being poured from the taller to the shorter vessel), in that he could not hold or retain a mental picture of the liquid in the taller vessel nor reverse his thinking comparing his new percept (liquid in the shorter vessel), with the mental image of what had been the liquid in the taller vessel. His thinking at this level of development is not-reversible. Neither can the child retain first impression mental images of objects until he has had additional experiences with the object. Piaget states, "In the absence of (operations),

operational reversibility, there is not conservation (retention of a mental image), of quantity". 19 The child's thinking is not operational.

Piaget is not concerned with child development "per se", but with how children gain knowledge (epistomology).

> To understand the development of knowledge, we must start with an idea which is central..the idea of operations..to know an object is to act on it. To know is to modify, to transform the object, and to understand the process of this transformation...An operation is thus the essence of knowledge; it is an interiorized action which modifies the object of knowledge. 20

Piaget alludes to the theory that thinking is a subtle form of movement.

> An operation would consist of joining objects in a class, to construct a classification. Or an operation would consist of ordering or putting things in a series ...In other words, it is a set of actions (mental movements), modifying the object and enabling the knower to get at the structures of the transformation. 21

The first operations (movements), appear at the concrete-operational level; the child can classify, etc. The child operates and manipulates objects, but cannot, as yet, cognitively predict outcomes or express hypothesis verbally. In the fourth stage the child exceeds these operations and can perform formal, hypothetic-deductive operations, using reasoning, hypotheses and symbols without the use of concrete props or objects, and he can construct new logical operations.

The three major stages--preoperational, concrete and formal operational can be summarized as follows:

Table IV

Piaget Stages of Development

Pre-operational (0-7 years)

1. Cannot conserve or hold mental images.
2. Thinking is non-reversible.

3. Thinking is perceptual bound (bound to physical body--the senses).
4. Cannot deal with variables or changes.
5. Little voluntary control thinking (non-operational).

Concrete-operational (7-11 years)

1. Can conserve (hold mental images).
2. Thinking is reversible.
3. Thinking bound to inner-life, emotionally-affectively oriented.
4. Thinking is imagery and pictorial, not symbolic
5. Needs concrete props to support thinking, such in as problem solving.
6. Can solve problems with transformations, variables or changes.
7. Has greater voluntary control over thinking--(thinking is semi-operational).

Formal operational (14...Years)

1. Solve problems using symbols and pure concepts without outer concrete props.
2. He can hypothesize solutions using propositional logic.
3. Thinking is more objective, more free of emotional life.
4. Thinking is abstract flexible and mobile--grouping classifications, etc.
5. He can think about his thinking for the first time.
6. He has greater voluntary control over his thinking processes. (Thinking is fully operational).

If one examines these three stages of Piaget's theory in their proper sequence, as interpreted by the author, the theme of increased voluntary control over cognitive processes seems to be the thread of transmutation through the three stages. Each succeeding stage depicts an increased independent and higher level of cognitive process. Each unfolding stage indicates a greater and greater manipulative power and control over thinking. Also the terms "pre-operational" and "operational" signify this. These terms are cogent and relevant; they accurately describe the cognitive abilities at the different levels.

Preoperational means the inability to operate one's thinking; it is non-operational noncontrollable by the child. His physical and experiential maturity are not developed sufficiently at the preoperational level to give him the power to control his own thinking processes. At this stage the child cannot conserve, reverse his thinking, deal with variables, and changes, etc. Whereas at the concrete operational level, his thinking is operational, i.e., he can control it to a certain degree in terms of conservation and reversibility and the ability to handle variables. An increased pattern of voluntary control is exhibited at the formal operational level when the youngster's thinking is more abstract, symbolic, logical and most importantly more mobile, flexible and freer.

The author has advanced the theory of voluntary control of movement through the stages of locomotive, speech, and cognitive development. Associations between physical maturation and speech development, and maturity and the ability to perform certain tasks (e.g., copy geometric forms), have also been explicated. The theory has been advanced that thinking is a more subtle form of movement. Since physical movement requires power, force and energy, it might be expected that thinking does as well. Anderson spoke of psychological and physiological entropy as a result of the degradation of biological energy levels. 22 Piaget states that the gaining of knowledge,

> ...ties to the whole process of embryogenesis (development of the whole human organism). In the case of the development of knowledge in children embryogenesis ends only in adulthood...development is the essential process and each element of learning occurs as a function of total development. 23

The child can not be forced or coerced from one stage of cognitive development to a higher stage; he must wait until he is maturationally ready. Neither can he skip a cognitive stage in his development. Physical and experiential maturation are the prerequisities for cognitive development.

What is the relationship between physical maturation and mental growth? How does it relate to the voluntary control of movement and the concept that thinking is a subtle form of movement? And how does this relate to the

phenomenon of the expending of energy in movement? Let us examine the relationship between physical and mental development as it occurs at the transitional period between the preoperational and the concrete operational stages of cognition.

Piaget and others place this transitional period at about the age of seven years. Ilg and Ames conducted a study on the rate of teething in relation to school readiness with first grade children. 24 They found that those children who were ahead of schedule in teething 96% were definitely ready for and could profit from academic experiences. Of those children who were behind schedule in teething, 94% of the children should have repeated (22% did repeat), the first grade. The mean age for teething was 6 years 8 months. Ilg and Ames stated that subsequent to teething the child seems to have reached a higher level of mental development, indicating a cause and effect relationship. Steiner indicated this relationship 50 years ago. 25

What does this mean in terms of the transitional period between the preoperational and concrete operational cognitive stages, which occurs at this period in the child's life? Teething signifies that the brain has reached about 95% of its development, the head about two-thirds of adult proportion, and now the child is ready for academic learning. He has had a change in mental development; he has crossed the bridge between the preoperational to the concrete levels of thinking. He now has greater control over his thinking, it is freer. How and why does this occur?

Let us look at a phenomenon that we see and experience, to a certain degree, everyday, but are not aware as a process. That phenomenon is the process of growth. We know the child grows from the head downward; plants grow upward. Each germinate from a sperm and a seed, respectively. By means of accelerated photography, we can see a plant growing. How does the plant grow physically, through chemical reaction, germination process, photosynthesis, etc.? This does not appear to be the solution. Perhaps we could look at it from another point of view. Growth and movement require energy. Just as a ball propelled through the air by the thrower, and an automobile racing down the highway is propelled by the power of the engine under its hood, so human growth is propagated by energy.

Perhaps we could call this energy, growth forces. Is this not a valid approach? After all, no one has ever seen magnetism or electricity, only its effects and end products. The same is true of the atomic theory. No one has ever seen an atom, an electron. Nevertheless, we borrowed from the microcosmic world, our planetary system and galaxy, to explain our chemical and material work through the use of the atomic theory, a micrc cosmic picture of our universe. The scientific theories explain physical phenomena. Why cannot one use the same approach to describe the phenomena of human growth and development? Let us examine this theory of energy forces on the basis of a selected model. Models or hypothesis are merely perceptual aids to explaining phenomenological relationships, to gain a fuller understanding. As the models become more refined and differentiated, they become the criteria by which we test and judge the accuracy of our reasoning and understanding. The primary purpose of the model is to provide a sufficient comprehension of the subject to facilitate further inquiry and investigation as well as the possible validation the model. Let us first examine the phenomenon of etheric or growth forces in relation to physiological and mental development.

As explained, the change of teeth occurs at age seven as does the transition between the preoperational and concrete operational levels of cognition. One could say that since the brain has reached 95% of its physical development, the change of teeth at this period signifies that most of the forces of physical growth have completed their task in the development of the brain and head. These growth forces are then released for the forces for thinking (as indicated, thinking does take energy and power to become operative--concrete operational). Now the child has greater control over his thinking as a result of the greater amount of energy now available for cognition.* The child has reached a higher level of cognitive processes, the concrete operational level. His thinking is no longer bound to the senses--his physical body. Just as the growth forces are partially released from the physical body, because of the attainment of a level of physical maturation, therefore so is the thinking released and freed from the physical body, making it operative and controllable.

Jensen indirectly elucidates this phenomenon when he points out that the whole in learning is just as, if not

*Review Table IV, the Piaget Stages of Cognitive Development

more, important than the subskills or the sum of the parts.

> It is the child's progressing ability to integrate the component subskill that the phenomenon called readiness is most apparant. It is the integrative process, the development of a higher order "master plan" that depends most upon the maturation of brain structures. (Piaget speaks of this as operations--the ability to operate on the learning).26

Jensen demonstrated this point when he attempted to teach his five year old daughter to play chess. She readily learned the names of the six chess pieces, the placement of pieces on the board and the rules for moving each piece. She was highly motivated, and her learning proceeded smoothly through the cumulative-associative approach. However when it came to playing the game, putting together all that she had learned, "...a game did not emerge". A year later, age six she had no trouble in playing chess. She had reached a level of maturation and cognitive development where the subskills were integrated into an organized whole. From the theory proposed here, one could say that the child had thus reached a level of physical maturation, releasing the growth forces for thinking. The child now had more power or energy for greater cognitive control, for manipulation and integration of subskills and learnings. The child now possessed the cognitive energies which are transmutted forces of growth to control her own thinking. One could say that when the growth forces are released for thinking, it is as if the shepherd appeared amongst the flock to establish peace and order. Mann supports this view of transmuted growth forces into the capacity for cognition,

> The capacity for the regeneration of the tissue in the human being must be taken into account when judging the possibility of a cure. It must be remembered that the human has less power of regeneration than any animal, and vastly less than the lower animal. A flat worm will completely regenerate itself if it is cut in half longitudinally or transversely (so that two flat worms are made out of one); if the tail of a rainworm

> is cut off, it will partially regrow; the fin of a lung fish will grow again if it has been broken off; similarly the limbs of an amphibia...The human being has not the same regenerative power. His creative energy has been transferred to the power of thought. 27

Let us examine this phenomenon from the viewpoints of physiology and acupuncture. The reason evidence seems to be rather sparse is that Western scientist and physiologist have been limited by their mode of thinking. The knowledge of natural science which explains inorganic life had been applied to organic life, the region of life. It is becoming quite clear that the forces which are operative in the inaminate world cannot explain the phenomena of life.

Acupuncture is an ancient Chinese method of healing by the placement of fine needles in the skin at certain acupoints. The stimulation of any of these 800 or more nerve center or acupoints causes the flow of a nerve impulses or energies in the body. This traditional Chinese art of healing, which is being researched in this country, is based on years of empirical research,

> ...that in good health there is a free and unimpeded circulation of energy-the life forces - flowing from organ to organ along an invisible network of intercommunicating channels (14 meridans). 28

The blockage of one or more of these channels brings on illness--an imbalance in the organism. These life forces which flow along meridians or channels effect the flow of blood to effected tissues. The concept of energy or current flow stems from the ancient Asiatic theory or knowledge that the physical organs are temporary deposits of a number of currents which move continously at various speeds throughout the body. It is known that the substance of the liver is changed in the course of ten days, the tongue can regenerate itself, whereas the substance of the brain takes much longer, and it is almost six months before new tissues appear in the bones.

Since 1939, the Russian have done extensive research in the area of parapsychology, including studies on the energy body. Ostrander and Schroeder visited Russian research centers and report in their book, Psychic Discoveries Behind the Iron Curtain that the energy body,

> ...is a brand-new idea in Soviet biology... but throughout the ages it's been called the 'subtle body' the 'etheric body' 'fluidic body' ...'beta body' 'counter body' 'pre-physical body' to name a few. 29

They further report that Russian scientists announced their discovery in 1969, based upon scores of experiments done on living plants, animals and human beings using sophisticated electronic equipment. They concluded that the energy, etheric or biological-plasma body consisted of...,

> Some sort of elementary plasma like constellation made of ionized, excited electrons, protons and possibly other particles. But at the same time, this energy body is not just particles. It is not a chaotic system. It is a whole unified organism in itself. It acts as a unit..and as a unit give off its own electromagnetic fields and is the basis of biological fields. 30

The scientists stated that the dynamic energy body has a specific spatial organization. "The biological plasma of the energy body is specific for every organism, tissue and possibly bio-molecule. The specificity determines the form of the organism". 31

Ostrander and Schroeder comment that their investigations showed,

> Within the last few years, many scientists in many countries * have postulated that there is some kind of matrix, some kind of invisible organizing pattern inherent in living things. 32

The bioplasmic body or growth body contains energy levels that sustain the development and replacement of cells in the body. Acupuncture releases and then balances the flow of energy throughout the body. Anderson spoke of energy transference in terms of psychological entropic and antientopic energy levels. 33 Ostrander and Schroeder report research on the photographic process developed by Russian scientist Kirlian by which the energy of bioplasmic body

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* Scientists at Stanford University and private research foundations, such as the Academy of Parapsychology and Medicine in California have been replicating the Russian's research and pioneering research on the bioplasmic body and in acupuncture.

can be photographed. Kirlian concluded that,

> ...the energy body didn't seem to be merely a radiation of the physical body. The physical appeared somehow to mirror what was happening in the energy. 34

It was reported that the Kirlian process was used to photograph the moment of death in plants and animals. Slowly as the plant or physical body died,

> ...the Russians saw sparks and flares of the bioplasmic body shooting out into space, swimming away and disappearing from sight. Gradually there was no luminescence at all coming from the dead plant or animal. 35

They hypothesized that the energy coming from the dying physical body is the dispersing bioplasmic body. This could be what Anderson refers to as physical entropy, the degradation of physical energy.

Another piece of evidence that seems to confirm the existence of an etheric or bioplasmic body is the phenomenon of the phantom limb. Persons who have a missing limb often continue to sense the missing arm or leg as if it were still there. 36 Research by Weinstein and others have shown that among 101 born with missing limbs, 18 had clear perception of phantom-limbs. 37 In the development of body-schemes in children it was found that there was no difference between blind and normal children in the development of the body scheme with respect to hand-perception. This indicates the child's visual perception of its own physical body and of the body of others had no influence on the development of his own body scheme or image. The same phenomena is true of children born with missing limbs. These children showed body-scheme perception of all limbs. 38 Since the development of a body-scheme is not dependent upon the physical limbs, the phantom limb must be the basis for the development of the body-scheme. That is, the phantom or bioplasmic limbs contains the functional gestalt and the dynamic processess or biological pattern or energy forces of growth, which facilitate the development of the physical limbs, when present. The phantom limbs grow and develop just like the physical limb, except it is non-material, invisible. Steiner referred to this as the functional gestalt, the ether body or the body of the formative creative forces of growth. 39

He* asserted that human development and the accompanying development of a body-scheme in childhood is the birth of the freeing of the child's formative or etheric forces of growth. When the child reaches certain levels of physiological or biological maturity (e.g. at age seven teething, or ages 12-16 puberty), the forces of growth are then released for the new, but more subtle functions of memory and thinking.

Implications:

Viewing physical and cognitive development from this standpoint, a number of other questions relating to human development and education seem to fall into place.

In relation to human development, organismic growth patterns exist in varying degrees of change-rate. This growth pattern either can be slowed down or supported by the quality of the child's environment. On the other hand, growth cannot be forced or coerced. Growth is a positive, constructive process, and for its optimum development it needs a propitious environment.

> Man is not only a product of his environment, for in a very real sense man is also a victim of his environment. 40.

Socially-disadvantaged children born in poverty conditions are prime examples of environmental retardation. An extremely detrimental, or abnormal home environment condition can cause emotional deprivation and growth retardation, resulting in simulated idiopathic hypopituitary conditions, in come cases.41 Anderson describes this phenomenon as environmental press, domination and disorganization, which results in psychological entropy, the degradation of psychological and biological energy. The end result is physical entropy. For a child reared in a disorganized chaotic, low-quality stimulating environment the organismic growth pattern is slowed down. The transition through the development stages takes place more slowly and less completely, Ausubel concludes,

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* Steiner had lectured and written extensively on the etheric forces, perhaps, more than any other person. Recently, Dr. Felix Mann M.B. stated in the preface of his book, Acupuncture: the Ancient Art of Healing and How it Works Scientifically, 1971, "The Writings of Rudolf Steiner enabled me to understand what the Chinese mean by their reference to lifegiving forces and the interplay of the material and non-material."

> the child who has an existing deficit in growth incurred from past deprivation is less able to profit developmentally from new and more advanced levels of environmental stimulation...his deficit tends to increase cumulatively and to lead to permanent retardation. 42

In other words, both psychological and physiological entropy have occured, and the child's energy levels are lower. The plasticity of development tends to decrease faster as compared to a child exposed to a more propitious environment. The organism seems to become fixed earlier, inflexible and hardened sooner. The plasticity of intelligence, which tends to decrease with age in any case, is accelerated, thus limiting the disadvantaged child's degree of freedom to respond developmentally in a certain direction which is compatible to the environmental stimulation. This decrease in plasticity in intelligence is accelerated in proportion to the decreased rate of transition from the concrete to the formal operational levels of cognition, and in direct proportion to the strength or amount of bioplasmic forces available to the child.

The reason for this retardation is the inadequate development and substainance of the child's bioplasmic forces during these formative years. As a result of the restrictive and chaotic stimulated environment there is a degradation of the child psychological and biological energy, resulting in psychological and physical entropy. The environment dominates the child's growth process, rather than sustaining them. His energy forces are scattered, and there is a loss of bioplasmic energy. This degradation or dispersement of energy in the human body has been confirmed by Kirlian by his high frequency photography of the bioplasmic body.

> Illness, emotion, states of mind, thoughts, fatigue, all make their distinctive imprint on the pattern of energy which seemed to circulate continuously through the human body. (In the pictures, you can see the fingertip of a normal, healthy person, photographed by the Kirlian process. The second picture shows the same fingertip of the same person this time he is fatigued and over-strained. More energy appears to pour out of the body when tired). 43

The depletion of bioplasmic forces during these formative years leaves little energy forces left to be transmutted for cognitive processes later on. Cumulative deficits result, Ausubel states,

> New growth...always proceeds from the existing phenotype...from the actualized capacity rather than from potentialities inherent in the genotype...If as a result of a consistently deprived environment during the early formative years, superior intellectual endowment is not actualized, the attained deficit in functional capacity significantly limits the extent to which later environment stimulation, even if normal in quantity, can increase the rate of cognitive growth. (The relative growth rate of intelligence remains constant).44

This theory of transmuted bioplasmic or growth forces seems to explain not only the retardation factor in environmentally damaged children, but is also applicable to mentally handicapped children as explained in the included article in this volume, and particularly Section V, "Music and Eurythmy". For mentally handicapped children have either a weakened , distorted or displaced bioplasmic body— an imbalance with his physical organization.

School readiness, along with the effects of premature learning, seems to find its rational basis in this theory. Research indicates that school readiness is a major concern, but it also indicates that pre-school, academic-readiness programs such as Headstart have been "ineffective in producing any lasting gains in cognitive development".45,46 Moore, Moon and Moore cite a number of studies in which children who began reading a year or so later than their peers surpassed earlier reading children in reading achievement later on in their school career. 47 Cases were cited in which pre-school age children who were exposed to academic learning exhibited a greater number of incidents of social-maladjustment than children who began their school career at a later age. Also the skill and knowledge retention level of pre-schoolers is much less as compared to later school entrants. Jensen states that children who are forced into intellectual learning beyond their present capacity or maturation level become "turned off". 48 Early learning is not only ineff-

icient, but there are indications that it results in a lower plateau of learning proficiency, creating a mental blockage in a particular skill, e.g., reading. It may even result in permanent cognitive and academic retardation. The socially disadvantaged is a good example of this phenomenon. Elkind and others have found negative correlations between early schooling and school success and attitudes toward school. 49,50 "The longer we delay formal instruction, up to certain limits, the greater the period of plasticity and the higher the ultimate level of achievement". 51 Let us look at these findings in light of our theory of transmuted growth forces into the forces for thinking. One could say cognitive readiness is a matter of the organism reaching a certain level of physical maturation at which time the growth forces are released to become the energy for thinking processes. Therefore, the pre-school child at the preoperational level does not have enough cognitive energy available to really cognitively act on the learning so as to fully experience it, to make it a part of his own experiences. Almy refers to these learnings as pseudo-concepts. 52 His learnings are non-transferable to new or different situations. This also explains why later school entrants seem to become more efficient readers than early school entrants. Since the pre-school-age learner has been burdened with these pseudo-concepts, (which are somewhat non-transferable), he is unable to use them as a foundation upon which to build or integrate with subsequent skills and learnings. He doesn't have enough cognitive energy to manipulate the concepts, to rehearse the learning; his cognitive plasticity is reduced in this area of learning.

Looking at the effects of premature or forced learnings, one could say that something never comes out of nothing. To gain one thing, something else must be sacrificed. So it is with accelerated learning or the attempt to speed up the stages of cognitive development; there is an accompanying loss in quality of development. Portman reports, "Whenever acceleration has occurred there has been a noticably increased susceptibility to certain diseases especially those of psychological origin". 53 Shortened processes of maturing cause later immaturity. This would, perhaps, account for the increased malajustment in early school entrants. Since learning is hardly ever a purely cognitive process but contains emotions (e.g., interest, motivation, preferences, etc),

it could be that the stress on early intellectual development entrophizes emotional development. As the immature learner becomes frustrated and anxiety-ridden, he loses his motivation for intellectual success later on. He becomes "intellectually burned" out. The result is a dissipation and loss of energies for physical and mental development. It may even percipitate mental and physical illnesses.

From the point of view of Chinese medicine--acupuncture--there is no essental difference between physical and mental illness. The mind and the body are integrally related. Mann summarizes this relationship,

> 1. A physical dysfunction can cause a mental disease.
> 2. A mental dysfunction can cause a physical disease.
> 3. A physical dysfunction can cause a physical disease.
> 4. A mental dysfunction can cause a mental disease. 54

Steiner also had a mind-body theory of development,

> For every thought-process there is a corresponding process within our organism; and the same is true of every emotional process which may be denoted as an "impulse of will" (our actions). 55

In short,"...whenever something takes place in our soul-life it produces a wave which repeats itself as far down as the physical organism." 56 Steiner points out that premature or forced intellectual learning may cause premature arteriosclerosis,

> If we force intellectual powers in the child we arrest growth...certain organic processes (etheric forces are depleted) that tend inwardly to harden the body are brought into play. These forces are responsible for the salty deposits in the body and are needed in the formation of bone, cartilege and sinew...in short, that have a tendency to become rigid. 57

There is a premature misdirection of the etheric forces in urging the young child to think for himself. The etheric forces are turned inward too soon. Therefore the physical body is less plastic and mobile in its formative potential. Physical maturity sets in sooner. In addition to this premature transformation of the etheric forces into cognition, intellectual thinking (as compared to meditation), actually percipitates the generation of salt deposits in the body.

> ...(the)...process of thinking is a salt-depositing process, so to speak, which is caused by a certain activity in our blood and which irritates and reacts upon our nerve-system...just as we can look at the water in the glass and observe the formation of the salt as it separated and crystalises, so we may see, when we observe a human being exercising thought. 58*

One could add that premature intellectual thinking causes a premature depositing of salts in the body which the etheric body is not able to control or suspend in a non-material state; because 1) the etheric forces are being usurped for cognitive processes from the task of developing the physical body, and 2) the result is a deficiency of etheric forces for physical development. This deficiency compounds the problem of handling , so to speak, the premature salt deposits in the bones, etc. **

However something else is sacrificed. What is sacrificed is the physiological development of the organism. It has been stated that energy forces for thinking are metamorphized from the same forces that facilitate physical growth. If the child is forced into intellectual learning

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* This process, according to Steiner, is very refined and subtle, one that is observeable by means of supersensible perception.

** Perhaps this is one of the reasons that young people mature physically sooner that did their ancesters. An example is that in 1850 girls reached menarche at age seventeen, today it is age 13.5, a decrease of approximately four years in a century.

prior to readiness, as determined by physical maturation, the child is prematurely using these forces to do intellectual thinking, which should be used to develop the physical organism. Hence physical development must be sacrificed, to some degree what may be sacrificed is the full development of the vehicle for thinking, the brain. Research has shown that gross brain changes take place from birth through adolescence, which entails the shifting of cognitive control from the emotional centers to the reasoning center. 59 If these bioplasmic forces are wasted on attempts at accelerated, premature cognition in young children, there is not only an entropism of the brain but an inefficient use of these forces as well. The reason for inefficiency is that the bioplasmic forces at this age level (pre-seven year old), are not totally free from the formative processes of physical development. Forced intellectual thinking at this period in the child's development prematurely drains off a certain portion of these bioplasmic forces, which should be utilized for physiological and, perhaps, emotional development.

The consequence is that there is not enough transformed bioplasmic energy forces to effect the efficiency of thinking (e.g. pre-operational to concrete operational). On the other hand, the physical body (brain), is being robbed of its growth potential. One could also state that the overall effects of forced premature intellectual learning is a form of retardation in that it effects the young child's total growth pattern--physiologically, emotionally and cognitively. The wasting of these bioplasmic forces leads to physiological and psychological entropy. Therefore, it is important that these etheric or growth forces be sustained and developed in the growing child rather than being prematurely misused for intellectual learning.

In the case of children in need of special care--mentally retarded children--the etheric body may be weak or imperfectly developed. The etheric body does not properly penetrate the physical body or the personality of the child. 60 Here therapy, music and remedial eurythmy can help to effect a rebalance of the etheric forces. This is discussed in some detail in Section V.

Conclusion:

The theories of voluntary control of movement (locomotion, speech and cognition), and the transmutation of growth

forces have been explicated to rationalize the seeming relationship of physiological development to psychological development. It seems to establish a theoretical foundation for readiness and cognitive development. Perhaps what is more significant is the fact that the bioplasmic theory seems to explain why and how a deliterious environment effects the growth patterns of children. In a real sense, the bioplasmic theory becomes the key to human development in that the task of education would be to sustain and preserve these forces in a healthy state. Education would not be the acquisition of only knowledge, but a therapy. It is partially upon this theory of human development that the 300 Steiner schools for normal and handicapped children are based.

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